

IDAHO DEPARTMENT OF FISH AND GAME

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EFFECTS OF INCUBATOR TYPE ON KOKANEE
EGG TO SWIM-UP SURVIVAL



by

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ABSTRACT

After considering all the available facts, we concluded that upwell incubators would provide the best survival with a minimum of maintenance and care at a reasonable cost.

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OBJECTIVE

To test kokanee egg survival rates using three types of incubation systems. The test included Heath trays, upwell and drip-type incubators.

TECHNIQUES USED

On December 19, 1984, we took 275,400 kokanee eggs at the Sullivan Springs trap. These eggs were allowed to water harden before being transported to the Sandpoint Hatchery in Coleman plastic coolers. At the hatchery, the eggs were disinfected with wescodyne before being put into the various types of incubators. By using the displacement method, we measured and put the eggs into the various types of incubators. A summary of the loading density and water flow to these incubators can be found in Table 1. Table 1 also contains the pick-off numbers, the number of eggs and percent survival for each incubator type.

Our water conditions remained uniform throughout the test. The water temperature was constant at 44 C, and the dissolved oxygen level was between 8 and 9 parts per million. We did have some silt problems, but not enough to effect egg survival.

The lack of available water and space made it necessary to keep the Heath tray in a Heath stack with previously taken eggs. The stack received formalin treatments of 1,667 ppm every day until the earlier eggs completed hatching. From this point, the experimental eggs were allowed to develop without treatments until they hatched some 21 days later. These Heath-tray eggs were also divided into two trays after being picked at eye-up. The eggs in the upwell and drip-type incubators were neither treated nor divided; however, the water flow was increased to the upwell incubators after eye-up.

RESULTS

No significant difference in survival was noticed during the time period required for eye-up. During the period between eye-up and hatch, however, notable losses did occur in the Heath trays and drip-type incubators. Fungus appeared to be the cause for these losses. Since no feasible way of treating some of the eggs with chemicals while in the three systems was available, we did not treat any of the eggs. The upwell system was the least effected by fungus and the drip-type was the most effected by fungus. A summary of losses and survival can be found in Table 1.

Table 1. Pick-off and percent survival of kokanee salmon eggs incubated in upwell, drip-type and Heath tray incubators.

Incubator type	Flow in gal/min	Initial no. of eggs	First pick-off (at eyed stage)		Second pick-off (at swim-up)		Ending no. of fry
			No.	% survival	No.	% survival	
Upwell (A)	3.17 ^a	45,286	2,242	95.0	954	92.9	42,090
Upwell (B)	3.70 ^a	55,599	3,587	93.5	954	91.8	51,058
Drip-type (A)	2.64 ^b	44,390	2,243	94.9	3,816	86.4	38,331
Drip-type (B)	2.64 ^b	68,154	4,484	93.4	5,724	85.0	57,946
Heath tray (A)	5.20 ^c	45,268	2,242	95.0	2,862	88.7	40,182

^aThe water flow was increased to 7.25 gal/min, after picking at the time of eye up.

^bThe drip-type incubators would not take an increase in flow because of built-in limitations.

^cThe eggs were divided into two trays after picking at the time of eye up, but the flow remained the same.

DISCUSSION

I feel the losses from the fungus could be reduced if an effective treatment method was developed, without regard for which of the three systems was used.

I feel other factors should be taken into account when choosing which system would best serve our needs. These factors should include initial cost, repair cost, ease of care and handling, replacement frequency and storage room required. As I worked with the tests, I developed a comparison of the above-mentioned facts and summarized them in Table 2.

After looking at the facts, I conclude that the upwell incubators will provide a good survival rate at a reasonable cost. The ease with which the upwell incubators performed during the tests made it the better choice. The compact nature of the upwell incubators requires less space than the other systems and this factor also made the selection process easier.

For water systems and facilities similar to those at the Sandpoint Hatchery, the upwell incubator system would provide many years of trouble-free service.

Table 2. Other factors effecting incubator choice^a.

Incubator type	Initial cost	Repair cost	Storage space required in inches	Ease of handling	Estimated frequency of replacement
Upwell	\$50-\$70	minimal	12" x 24" x 30"	easiest	10 years
Drip-type	\$20-\$30	high	22" x 24" x 78"	easy	3 years
Heath stack	\$1,000	low	25" x 25" x 64"	hardest	10 years

^aThe above ratings are per unit, capable of handling around 400,000 eggs/fish each, to swim-up.